

FCC TEST REPORT

Product Name: Active Noise Canceling True wireless headphones

Trade Mark:



or PHILIPS

Model No.: TAT3509

Add. Model No.: TAT3519, TAT3509xx/yy, TAT3519xx/yy
(xx=AA-ZZ or blank denoted different color; yy=00-99 denoted different country destination)

Report Number: 2402069267EMC-1

Test Standards: FCC 47 CFR Part 15 Subpart B
ICES-003 Issue 7

Test Result: PASS

Date of Issue: June 27, 2024

Prepared for:

MMD Hong Kong Holding Limited
Units 1208-11, 12th Floor, C-Bons International Center, 108 Wai Yip
Street, Kwun Tong, Kowloon, Hong Kong

Prepared by:

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Version

Version No.	Date	Description
V1.0	June 27, 2024	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	MMD Hong Kong Holding Limited
Address of Applicant:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon,Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited
Address of Manufacturer:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon,Hong Kong

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Active Noise Canceling True wireless headphones
Model No.:	TAT3509
Add. Model No.:	TAT3519,TAT3509xx/yy, TAT3519xx/yy (xx=AA-ZZ or blank denoted different color; yy=00-99 denoted different country destination)
Trade Mark:	 or PHILIPS
DUT Stage:	Production Unit
Rated Voltage:	☒ DC 3.7V by Lithium-ion Battery ☒ 5V  1.0A
Classification of digital devices:	Class B
Highest Internal Frequency:	2.480 GHz
Software Version:	Earphone: V1.013 Case: V1.013 (Provided by the customer)
Hardware Version:	Earphone: V02 Case: V02 (Provided by the customer)
Sample Received Date:	February 1, 2024
Sample Tested Date:	February 24, 2024 to March 1, 2024
Note: The additional model TAT3519,TAT3509xx/yy, TAT3519xx/yy (xx=AA-ZZ or blank denoted different color; yy=00-99 denoted different country destination) is identical with the test model TAT3509 except the model number for marketing purpose.	

1.2.2 Description of Accessories

Cable	
Description:	USB Type-C Plug Cable
Cable Type:	Unshielded without ferrite
Length:	0.2 Meter

Battery (Charging Box)	
Model No.:	HT432043S
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.6 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	1.512Wh

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Battery (Earbuds)	
Model No.:	HT1160H
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.85 Vdc
Limited Charge Voltage:	4.4 Vdc

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
AC Adapter	HUAWEI	HW-050200Co2	N/A	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.6 DEVIATION FROM STANDARDS

None.

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1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	±4.7 dB
4	Radiated emission 30MHz-1GHz	±4.6 dB
5	Radiated emission 1GHz-18GHz	±4.4 dB
6	Radiated emission 18GHz-26GHz	±4.6 dB
7	Radiated emission 26GHz-40GHz	±4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	Test Requirement	Test Method	Result
Conducted Emission	FCC 47 CFR Part 15.107 ICES-003 Issue 7 Section 3.2.1	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 7 Section 3.2.2	ANSI C63.4-2014	PASS



3. EQUIPMENT LIST

Radiated Emission Test - 3M Chamber						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (dd mm, yyyy)	Cal. Due date (dd mm, yyyy)
☒	3m Chamber & Accessory Equipment	ETS-Lindgren	3m	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☒	Loop Antenna	ETS-Lindgren	6502	00202525	30-Oct-2023	29-Oct-2024
☒	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	00164202	30-Oct-2023	29-Oct-2024
☒	Pre-amplifier	ETS-Lindgren	118385	00201874	31-Oct-2023	30-Oct-2024
☒	Double-Ridged Waveguide Horn Antenna	ETS-Lindgren	3116C	00200180	1-Apr-2024	31-Mar-2026
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	30-Oct-2023	29-Oct-2024
☒	Receiver	ROHDE & SCHWARZ	ESIB26	100114	27-Oct-2023	26-Oct-2024
☒	Pre-amplifier	HP	8447F	2805A02960	31-Oct-2023	30-Oct-2024
☒	Broadband Antenna (Pre-amplifier)	ETS-Lindgren	3142E	00201566	30-Oct-2023	29-Oct-2024
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	30-Oct-2023	29-Oct-2024
☒	Multi device Controller	ETS-Lindgren	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	LISN	R&S	ESH2-Z5	860014/024	27-Oct-2023	26-Oct-2024
☐	LISN	ETS-Lindgren	3816/2SH	00201088	27-Oct-2023	26-Oct-2024
☒	Receiver	R&S	ESR7	101181	27-Oct-2023	26-Oct-2024
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	27-Oct-2023	26-Oct-2024
☒	Shielding room	ETS-Lindgren	843	Euroshiedpn-CT001270-1246	5-Nov-2021	4-Nov-2024
☒	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	120V ~60Hz And or DC 3.85V	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Conducted Emission	21.1	43.0	100.1	S202402052721-ZJA04/13	Linson Xie
Radiated Emission	23.2	54.4	100.6	S202402052721-ZJA04/13	Yana zeng

4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Test Mode 1: Charging the earphone+ Charging the Charging BOX Test Mode 2: Charging the earphones by charging BOX Test Mode 3: Charging the Charging BOX Test Mode 4: BT link
Conducted Emission	Test Mode 1: Charging the earphone+ Charging the Charging BOX Test Mode 2: Charging the Charging BOX Test Mode 3: BT link
Remark: The above test modes in boldface were the worst cases, only the test data of these modes were reported	

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz

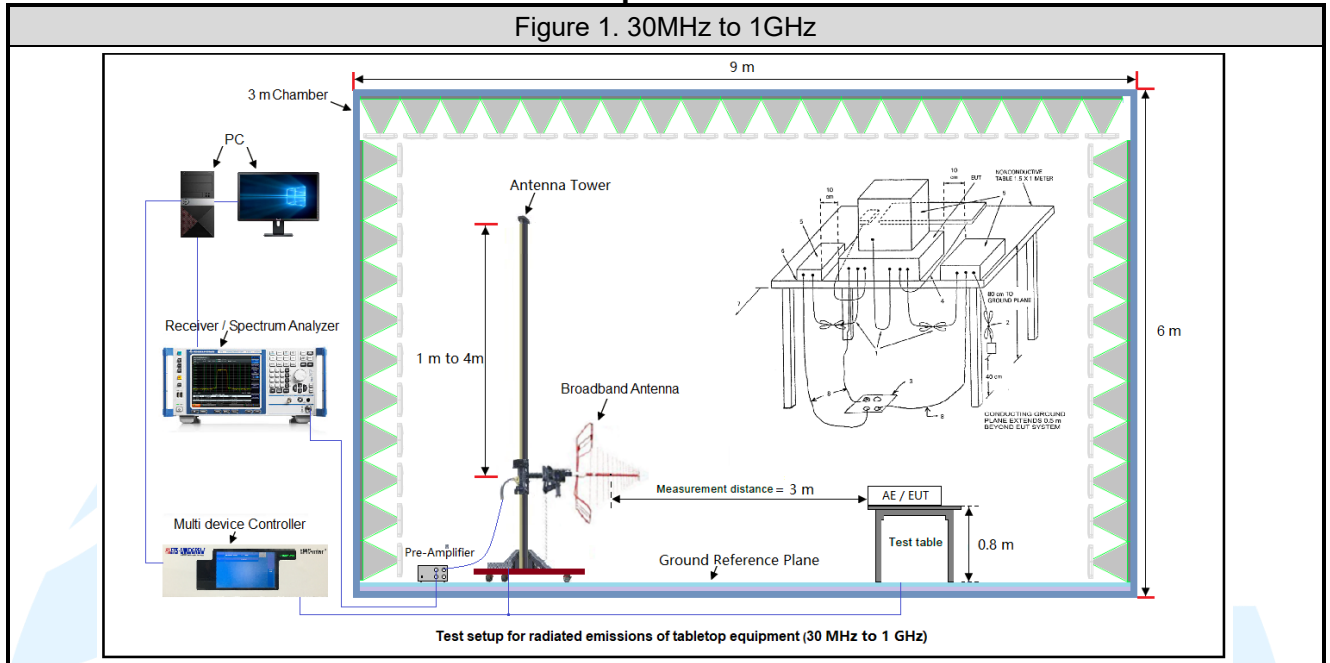
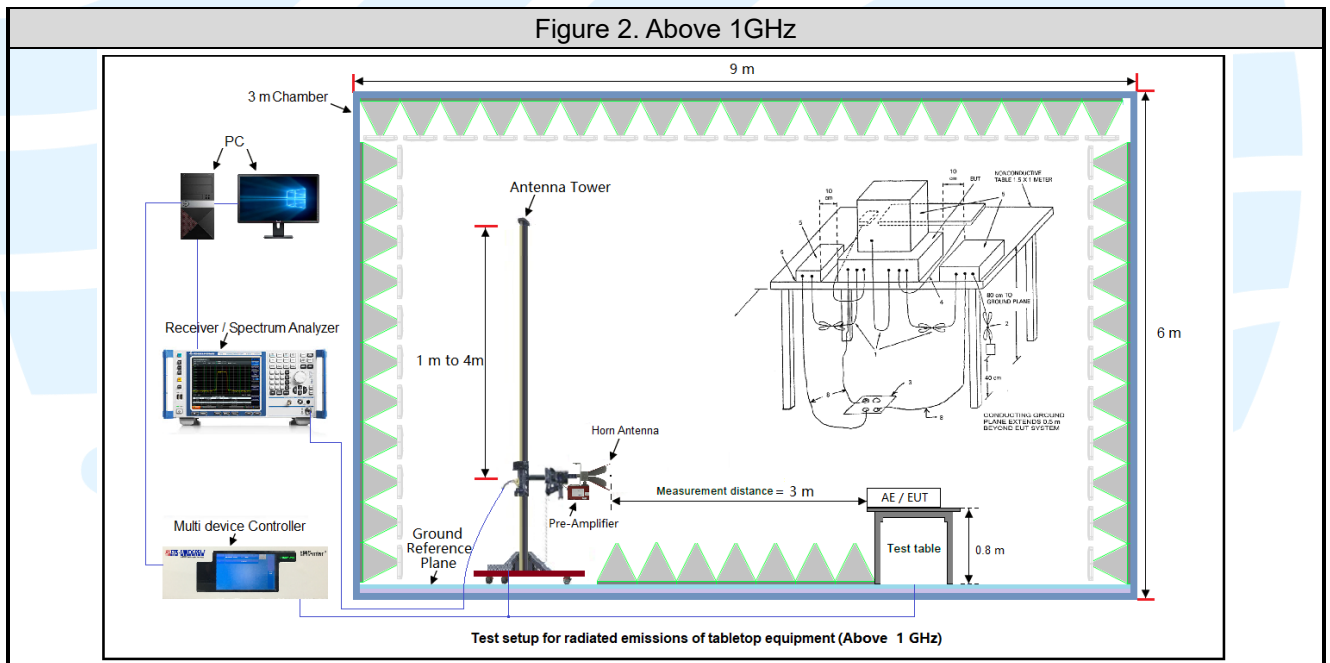
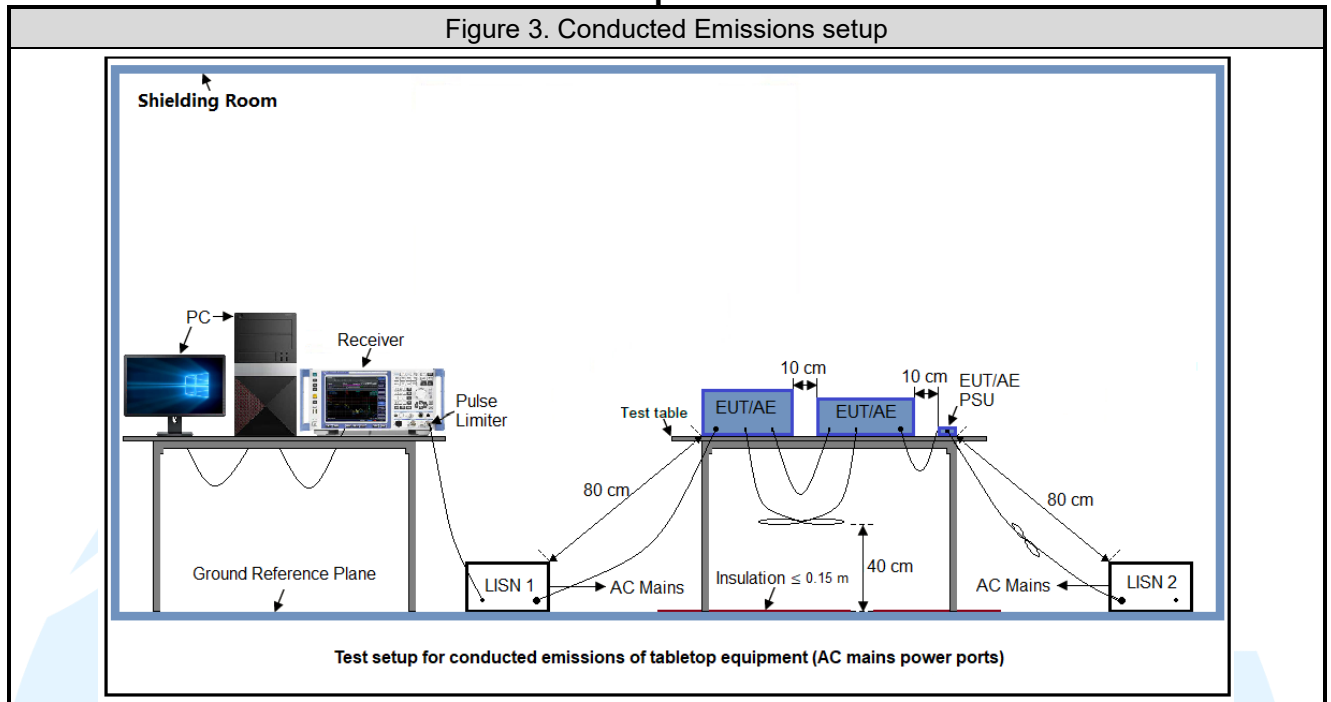


Figure 2. Above 1GHz



4.3.2 For Conducted Emissions test setup



4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ICES-003 Issue 7	Information Technology Equipment (Including Digital Apparatus)
3	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
5	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109
ICES-003 Issue 7 Clause 3.2.2

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
$30 \leq f \leq 1\,000$	Quasi Peak	120 kHz	300 kHz
$f \geq 1000$	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

FCC 47 CFR Part 15 Subpart B

Limits for Class B devices

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

ICES-003 Issue 7

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30 – 88	40.0	--	--
88 – 216	43.5	--	--

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216 – 230	46.0		
230 – 960	47.0	--	--
960 – 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:1. From 30 MHz to 1GHz test procedure as below:

- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

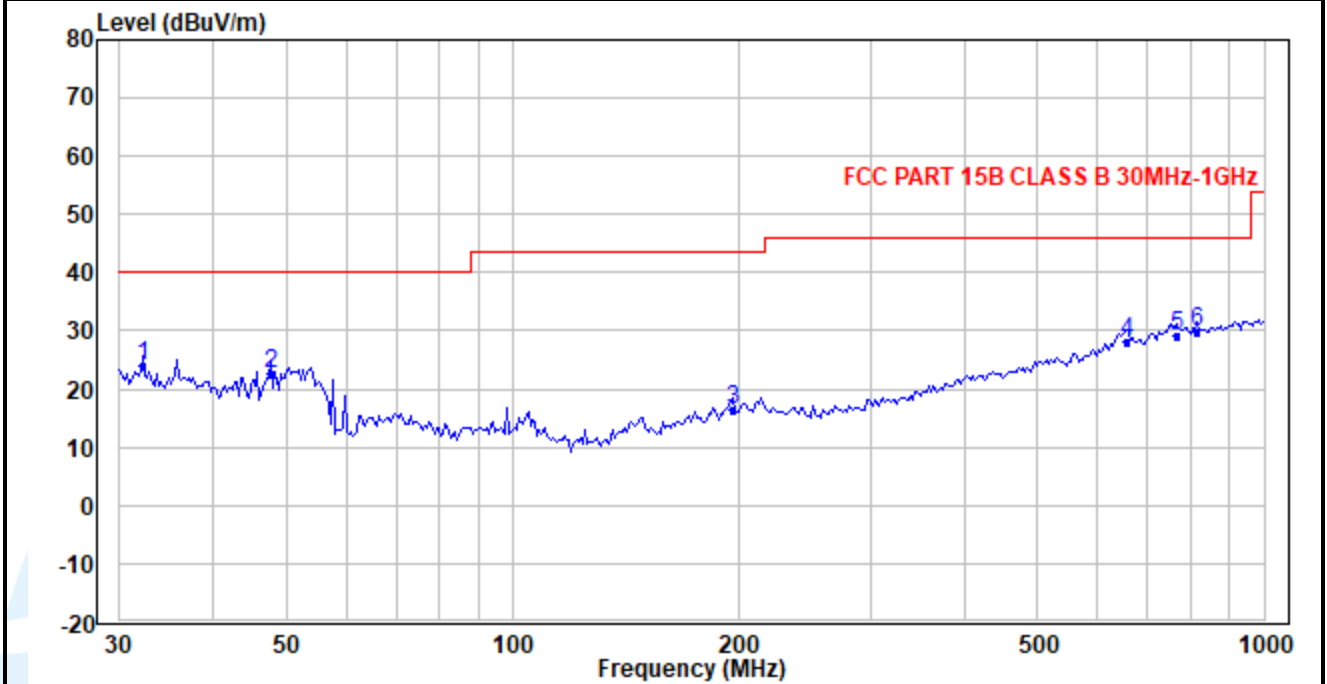
Test Result: Pass

The measurement data as follows:

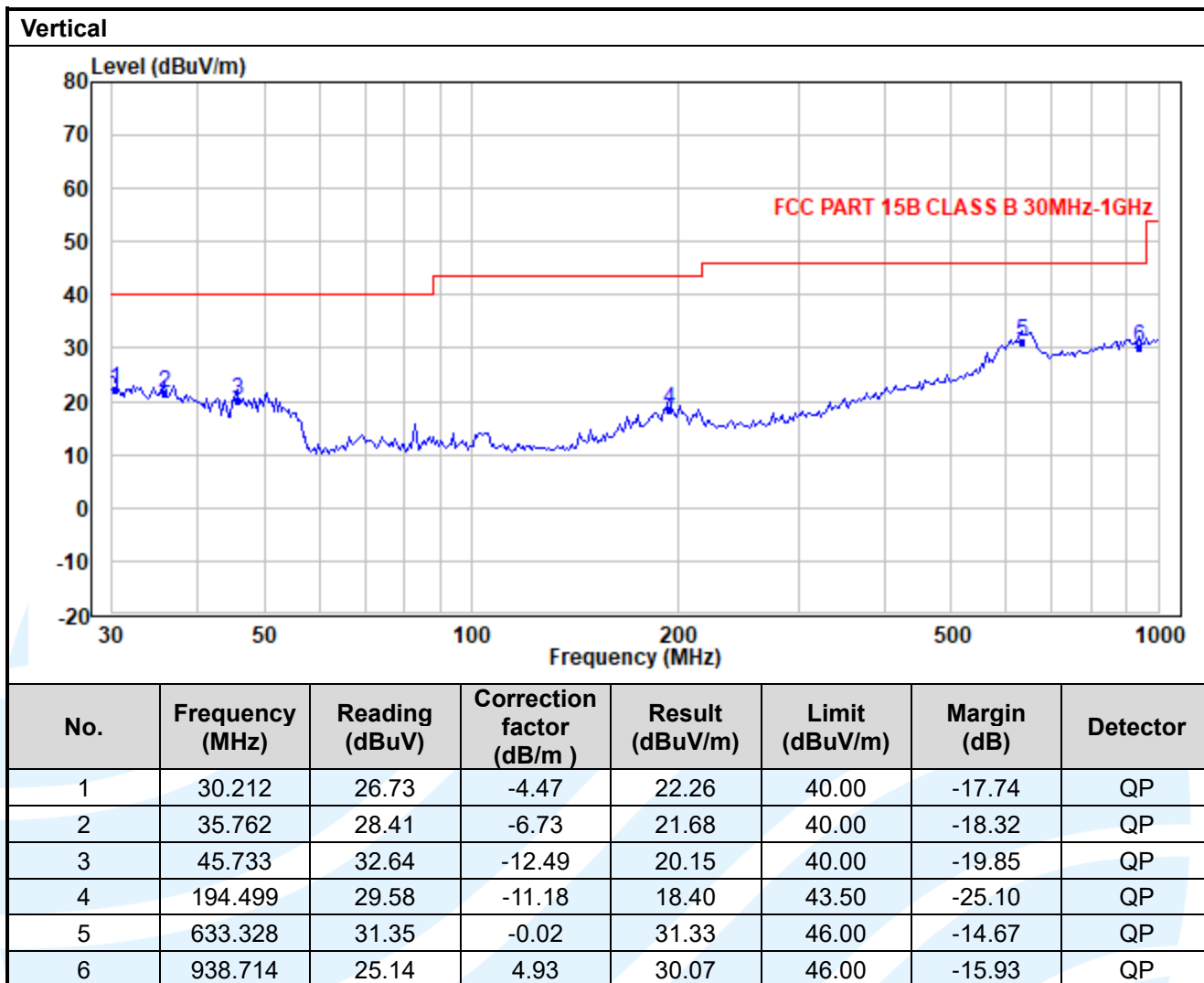
Below 1GHz(Quasi Peak):

Test Mode 1

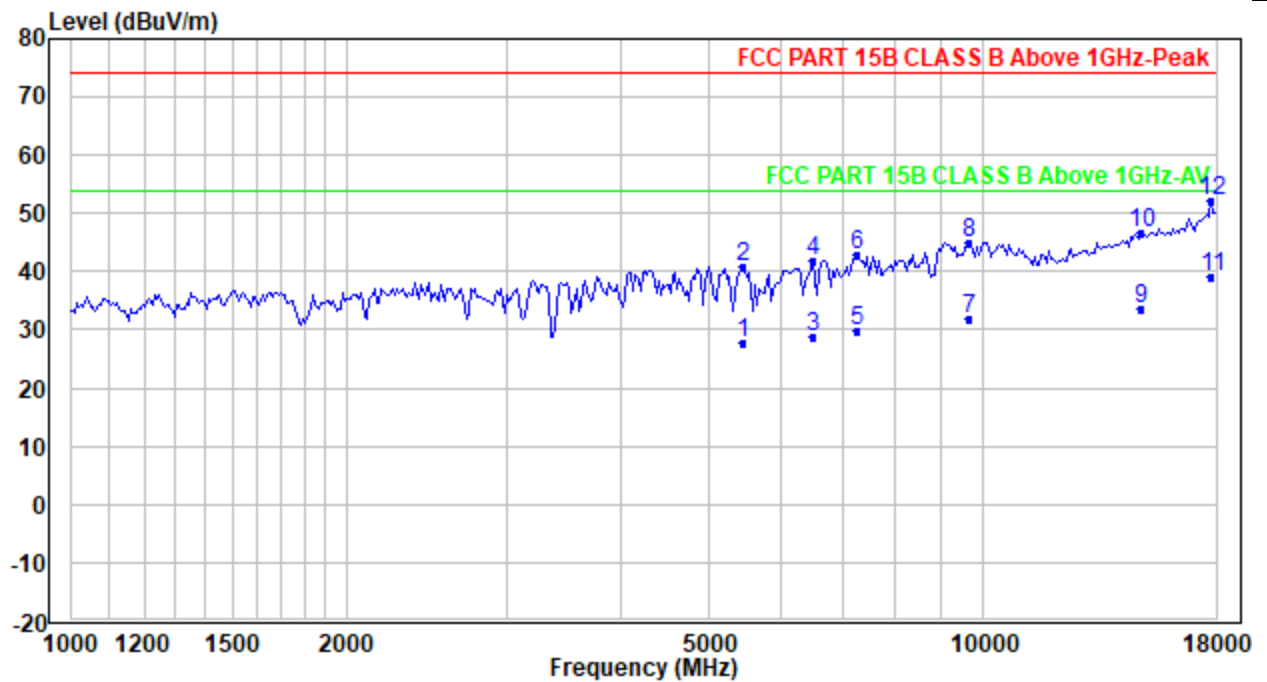
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.184	30.02	-6.18	23.84	40.00	-16.16	QP
2	47.703	35.61	-13.10	22.51	40.00	-17.49	QP
3	195.87	27.57	-11.18	16.39	43.50	-27.11	QP
4	655.977	27.77	0.41	28.18	46.00	-17.82	QP
5	765.648	27.00	2.26	29.26	46.00	-16.74	QP
6	815.635	26.23	3.45	29.68	46.00	-16.32	QP



Above 1GHz(Peak & Average)
Test Mode 3
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5458.38	27.27	0.60	27.87	54.00	-26.13	Average
2	5458.38	40.27	0.60	40.87	74.00	-33.13	Peak
3	6494.281	26.78	1.97	28.75	54.00	-25.25	Average
4	6494.281	39.78	1.97	41.75	74.00	-32.25	Peak
5	7249.817	26.87	2.89	29.76	54.00	-24.24	Average
6	7249.817	39.87	2.89	42.76	74.00	-31.24	Peak
7	9629.201	26.17	5.83	32.00	54.00	-22.00	Average
8	9629.201	39.17	5.83	45.00	74.00	-29.00	Peak
9	14868.2	22.31	11.34	33.65	54.00	-20.35	Average
10	14868.2	35.31	11.34	46.65	74.00	-27.35	Peak
11	17792.68	23.52	15.51	39.03	54.00	-14.97	Average
12	17792.68	36.52	15.51	52.03	74.00	-21.97	Peak

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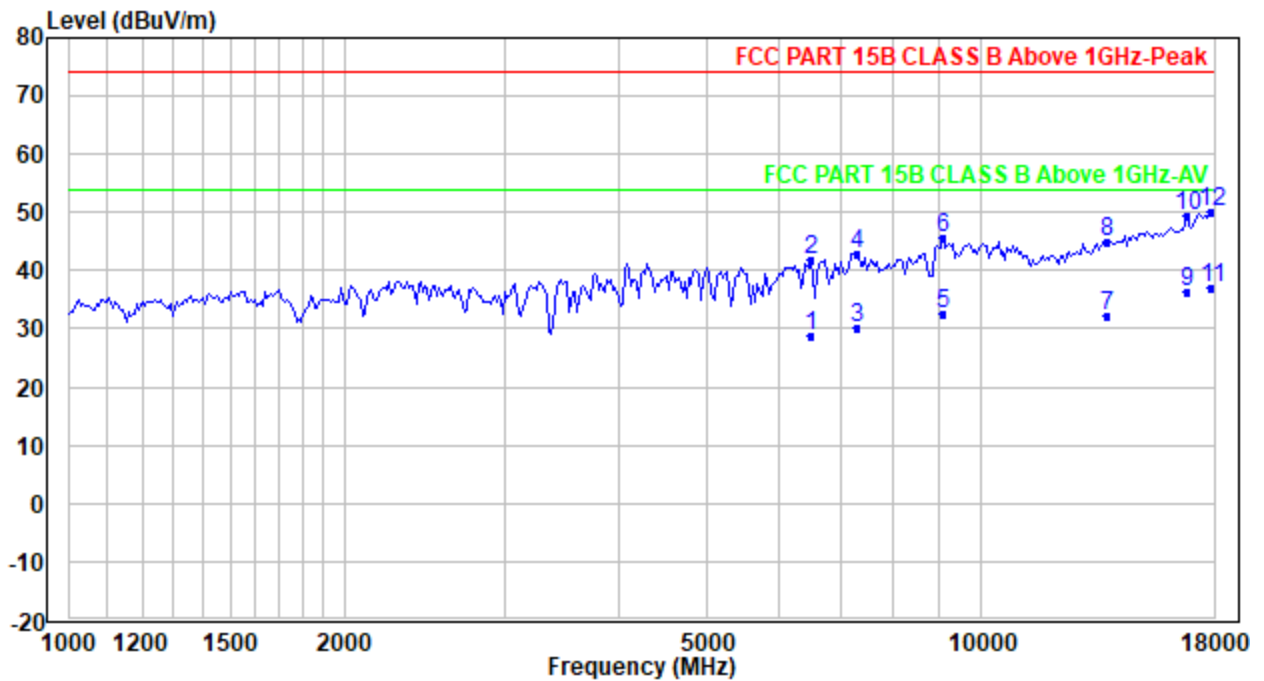
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	6494.281	26.95	1.97	28.92	54.00	-25.08	Average
2	6494.281	39.95	1.97	41.92	74.00	-32.08	Peak
3	7291.932	27.10	2.93	30.03	54.00	-23.97	Average
4	7291.932	40.10	2.93	43.03	74.00	-30.97	Peak
5	9087.293	26.93	5.78	32.71	54.00	-21.29	Average
6	9087.293	39.93	5.78	45.71	74.00	-28.29	Peak
7	13710.09	22.19	9.90	32.09	54.00	-21.91	Average
8	13710.09	35.19	9.90	45.09	74.00	-28.91	Peak
9	16791.35	23.64	12.64	36.28	54.00	-17.72	Average
10	16791.35	36.64	12.64	49.28	74.00	-24.72	Peak
11	17896.04	21.27	15.75	37.02	54.00	-16.98	Average
12	17896.04	34.27	15.75	50.02	74.00	-23.98	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. All possible modes of operation were investigated, only the worst-case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
6. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
7. The limit of ICES-003 in the 230MHz to 960MHz band is higher than that of FCC Part 15B, so the radiation emission test data conform to the limit of ICES-003.

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6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107
ICES-003 Issue 7 Section 3.2.1

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

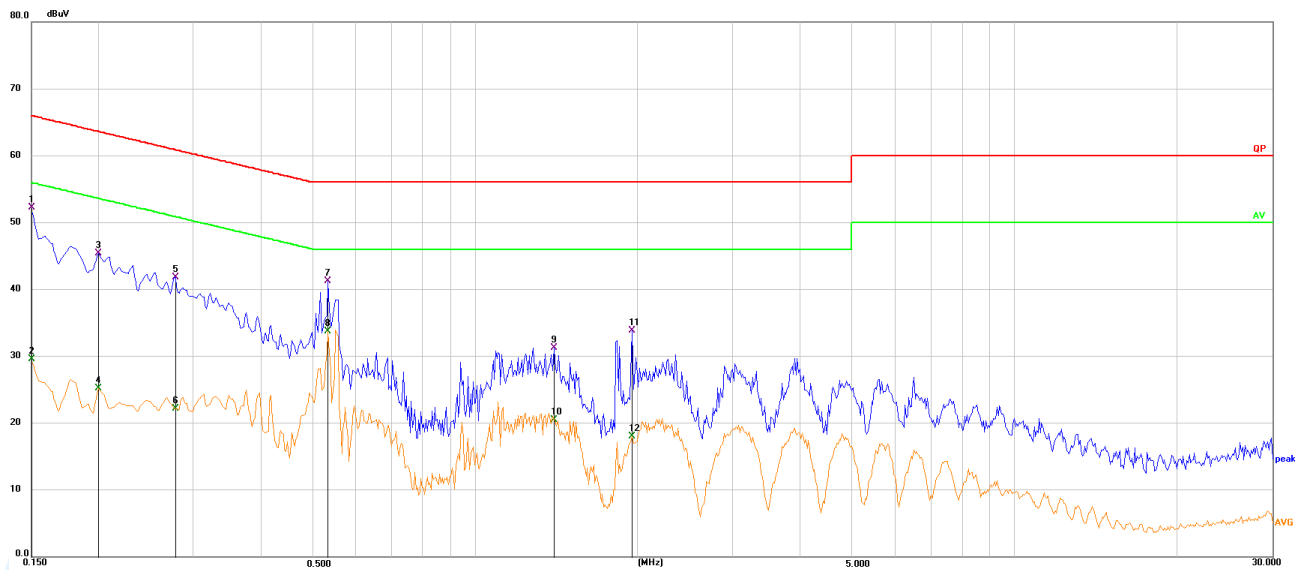
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

Test Mode 1

Live Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	42.04	10.20	52.24	66.00	-13.76	QP
2	0.1500	19.35	10.20	29.55	56.00	-26.45	AVG
3	0.1995	35.17	10.16	45.33	63.63	-18.30	QP
4	0.1995	15.02	10.16	25.18	53.63	-28.45	AVG
5	0.2760	31.64	10.20	41.84	60.94	-19.10	QP
6	0.2760	11.98	10.20	22.18	50.94	-28.76	AVG
7	0.5323	31.04	10.19	41.23	56.00	-14.77	QP
8	0.5323	23.53	10.19	33.72	46.00	-12.28	AVG
9	1.4010	20.94	10.30	31.24	56.00	-24.76	QP
10	1.4010	10.22	10.30	20.52	46.00	-25.48	AVG
11	1.9543	23.59	10.23	33.82	56.00	-22.18	QP
12	1.9543	7.75	10.23	17.98	46.00	-28.02	AVG

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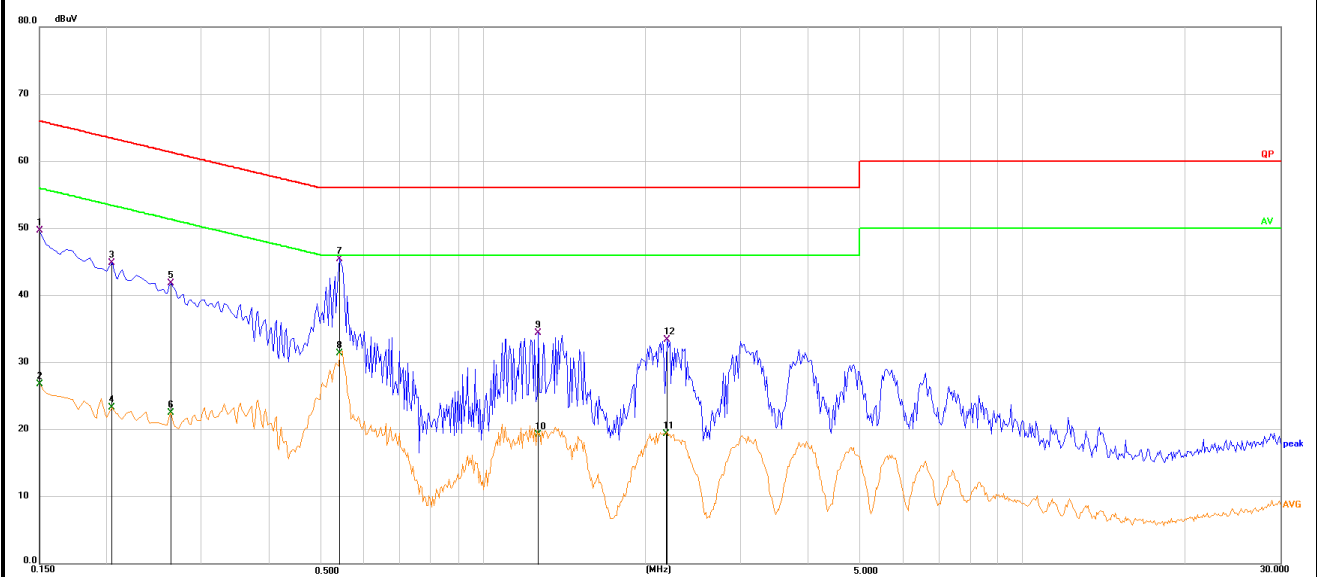
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E-mail: info@uttlab.com

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Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	39.48	10.19	49.67	66.00	-16.33	QP
2	0.1500	16.53	10.19	26.72	56.00	-29.28	AVG
3	0.2040	34.76	10.05	44.81	63.45	-18.64	QP
4	0.2040	13.18	10.05	23.23	53.45	-30.22	AVG
5	0.2625	31.76	10.08	41.84	61.35	-19.51	QP
6	0.2625	12.43	10.08	22.51	51.35	-28.84	AVG
7	0.5415	35.16	10.27	45.43	56.00	-10.57	QP
8	0.5415	21.10	10.27	31.37	46.00	-14.63	AVG
9	1.2660	24.16	10.20	34.36	56.00	-21.64	QP
10	1.2660	9.04	10.20	19.24	46.00	-26.76	AVG
11	2.1795	8.99	10.32	19.31	46.00	-26.69	AVG
12	2.1975	23.02	10.32	33.34	56.00	-22.66	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, only the worst-case emissions reported.

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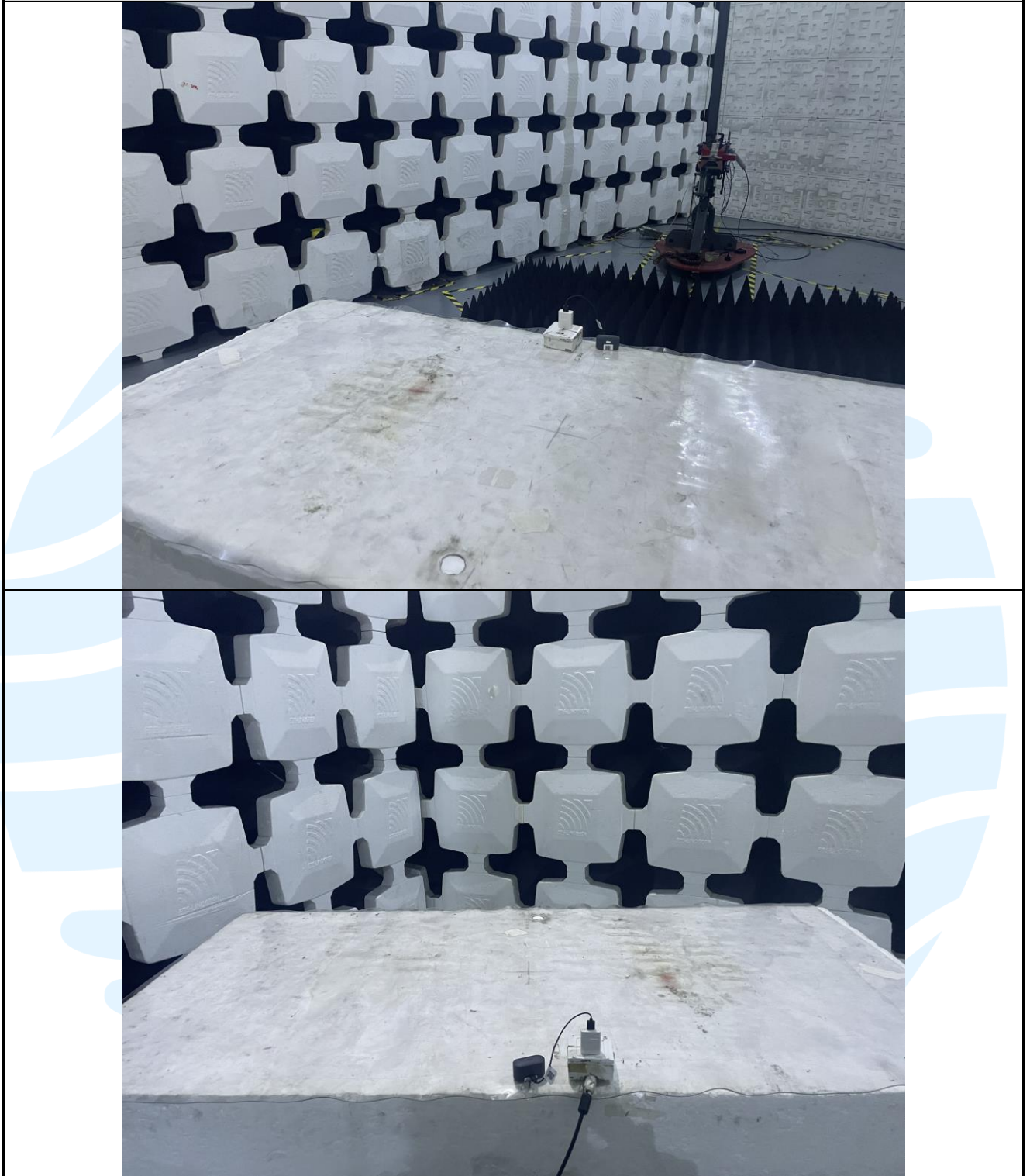
<http://www.uttlab.com>

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APPENDIX 1 PHOTOS OF TEST SETUP



Radiated emission Test Setup-2 (Above 1 GHz)



Conducted Emission Test Setup-3

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APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos

***** End of Report *****

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
